Chapter XL
Ontologies and Law: A Practical Case of the Creation of Ontology for Copyright Law Domain

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ABSTRACT

This chapter introduces the reader with the specificity of the development of a particular type of legal ontology, that is ontology of copyright law. The process of the development of this ontology (ALIS IP Ontology) should be seen as a miniature guide for anyone who will pursue a goal to create an ontology for any sphere of law. In this chapter the development of the copyright ontology is not addressed separately as such, but in vaster perspective, analyzing not only particular problems that the development of the legal ontology implies, but also looking at the ontology development issues in the light of the general relation that the law (and intellectual property law in particular) has with the IT domain.
1. INTRODUCTION

Where does the term “ontology” come from? This term was introduced by metaphysics, which, according to Aristotle, is divided into two directions of study: studies of existence as such and studies of eternal and immaterial entities. For the latter studies the term “rational theology” was applied, while for the former, the term “ontology” was introduced in XVII century: the illuminist philosopher D’Alembert (1717-1783) defines ontology as the branch of philosophy that studies the general properties (like possibility, existence or duration), shared by both spiritual and material entities (Rossi, 1996, p. 240).

This Handbook is dedicated not to the philosophical ontologies though. In this chapter we present the reader with the different kind of ontologies: the ontologies that enable the functioning of the Semantic Web. This chapter focuses on the ontologies developed for a particular domain, that is a legal domain. We describe the legal ontology dedicated to the intellectual property (IP) law, that is ALIS IP Ontology, on which our research group is still working on.

This chapter is organized as follows: Section 2 describes the role the Semantic Web plays in solving the problems of legal domain, with the emphasis on the legal ontologies that provide a big help in this problem solution (section 2.1). Section 3 is dedicated to the particularity of the domain our ontology is addressing, that is intellectual property law. Section 4 introduces the ALIS project to the reader in order to explain what is the purpose and the role of the ALIS IP Ontology. Section 5 is entirely dedicated to explain ALIS IP Ontology: we confront it with other ontologies of IP law domain, such as IPROnto and ICLOnto. The chapter ends up with the conclusions.

2. LAW AND THE SEMANTIC WEB

Law has two major problems today: “handling the complexity and types of legal knowledge, and having reasonable ways to store, retrieve and structure a great amount of legal information” (Benjamins, 2005, p.1). These problems are much more evident in the light of technological development. Naturally, information is a key to success everywhere, not only in legal campus. Nevertheless, law is also the field that has a direct and powerful influence in society: from the citizens to the organizations, from the families to the public administrations. All the lawyers have to know a lot of information, to choose the right resources for retrieving it, to manage it, to know how to apply it and so on. The technological explosion does not cease to make more and more information available. The problem now is not to get the information, but to manage it. And in law this problem is quite an urgent one, considering the quantity of norms, regulations, directives, rulings, codes, statutes, acts, decisions that are created, emanated, abolished, changed, updated, delivered every day.

What are the risks of this situation? The main risk is the so called Information Overload (IO) phenomenon. This situation happens when the lawyer is unable to handle the information to make a decision. In such case he gets overloaded: unable to process the information, to decide, to remember, to link the data and to react to the information he already has. In such a state, the errors usually occur and the price for such errors could be very high.

Furthermore, the legal information should be known not only to the lawyer. Everyone who is retained to be a person (legal or natural) under the law has to have a basic knowledge about the legal framework, or, at least, be able to orientate himself in it. Some specific professionals such as doctors or civil engineers should know further specific norms, which regulate their procession campuses. Of course, it does not mean the we
are all supposed to know the law at the level the lawyers know it. Not at all. It simply means that we have to have a certain common knowledge about the laws. This is an endless legal cobweb which winds us round and we cannot do anything.

So what can be done to help the lawyer to manage the legal information and to avoid an IO? (Noyes, 1995, p. 1) claims that we have to cure ourselves with what made us ill, that is IT.

A helping hand is the one of Semantic Web also known as machine-readable world wide web (WWW), which will enable the automatic extraction of the necessary information (from a monstrous quantity of the unnecessary one). In the Semantic Web the research bases not on the keywords but on the content, which is automatically understandable and processable (thanks to the www documents’ annotation with meta-information) by the computer.

The Semantic Web today is concentrated in several areas (like data-integration, convergence with Semantic Grid and knowledge management) but very few applications are destined to the areas of mobility, context awareness, and large scale semantic search: as (Van Harmelen, 2006, p.5) puts it, the Semantic Web applications are concentrated on closed communities (mostly companies, among which Vodafone, Amazon.com and Google), while the general public is left apart. Such situation is explained by (Cardoso, 2008, p.6): in order to be adopted, Semantic Web needs to promote its unique value proposition for specific target groups, such as industrial enterprises and other companies. Thus, the logic is that in order to win general community’s favour, the Semantic Web has first of all to win the one of economic community. Perhaps, it would be right to say that the conquest of the legal community could be called the second step towards the general success of the Semantic Web. In other words, the Latin saying divide et impera is quite at home here: the Semantic Web divides the community into a legal, economic, etc. and conquers one community at a time. We could say that the legal ontologies are the right weapon in order to make lawyers accept the Semantic Web.

2.1 Ontologies in Legal Domain

Ontological problem is simple and, according to (Quine, 1953, p. 1) could be expressed in three words: “What is there?” The answer is “Everything”, or “There is what there is”. For example, scientific ontologies ask what should, in the light of the current science, be considered as existing. More specifically the scientific ontologies are based on the accepted scientific theories, each of which is made of specific technical terminology (such as “ionic bond” in chemistry or “atomic lattice” in physics). This terminology implies further ontological questions on whether accepting the certain theories means also accepting the terminology and believing that it has references in the real world, that is the ontological question is: “Does atomic lattice exist?” or “Do the entities introduced by the scientific theories are real?”

Could we claim that the same logic applies to the legal ontologies? The answer is no. Legal ontology, as the scientific ontology, is made of specific terminology but here the similarities run out. Following the thought of Quine, we should admit that in law we do not have to ask whether the contract exist, as we know that it exists. The law addresses not the nature, but the entities we, humans, created. Thus we know that these entities exist. Furthermore, ontological engineering is concerned with knowledge capturing, thus, in legal domain, the ontological engineering is concentrated on capturing the legal knowledge.

Other point of view on how legal ontology distinguishes from the other ontologies, is offered by (Benjamins, 2005, p. 10): the legal ontologies are different because they have to cover a lot of common sense physical, mental, social concepts. Indeed, legal ontology on the one hand includes “responsibility”, “duty” and “right”, on the other, it deals with “article”, “judge” and “fine”. As (Benjamins, 2005, p. 10) puts it “in its normative
view, law is concerned with overt behaviour, but in assigning responsibility to individuals, mental concepts like intention and predictability play a crucial role”.

Whatever view we will prefer, the main problem is the same: to clarify legal concepts and their relationships and find their place in a big puzzle that the legal framework is. For this purpose the computer science offers the best tool, and ontology engineering is a discipline which directly addresses the problems of ontology building. In fact, (Guarino, 2005, p. 1) explains how the views towards ontologies have changed in the last decade: “ontology is no longer perceived as an arcane branch of metaphysics, the province only of philosophers; the study of ontology now fits squarely into the study of modern computer science and informatics. Building ontologies is now an essential activity that underlies nearly everything we do in the development of computational systems”.

Unfortunately, the computer scientists do not agree among themselves what the ontologies stand for. We propose two (one laconic and one more detailed) definitions. First one is “Specification of conceptualisation” which could be called the most famous definition of ontology proposed by (Gruber, 1993, p. 199). The conceptualization is intended as the simplification of the world. The second definition is “a set of terms of interest in a particular information domain and the relationships among them” (Mena, 2001, p.5). Substantially it is possible to draw a parallel with the philosophical point of view on ontologies. From a more technological point of view, however the ontologies are defined as “semantically rich metadata capturing the information content of the underlying data repositories”(Mena, 2001, p.5).

But what do the ontologies do practically? The functions of ontology are defined in (Hanh, 2006, p. 4) and are the following: first of all, the ontologies provide a predefined set of terms for exchanging information between users and systems. Secondly, they provide knowledge for systems to infer information which is relevant to user’s requests. Thirdly, the ontologies work out information classifying, filtering and ordering it and fourthly, the ontologies work on the arranged information through the indexing. Generally the ontologies contribute to elevate the level of application domain’s completeness. The specifications of these four functions are peculiar to each domain, and the legal one is no exception. The survey (Cardoso, 2007, p. 28) presents with the most popular practical purposes that the ontologies are used for: in almost 70% of cases, the ontologies are applied to share common understanding of the structure of information among humans and computers, while 56,3% use the ontologies for the reuse of the domain knowledge. Both of these purposes are easily applicable to the legal domain ontologies.

But how do we decide that the legal ontology is valid? A part from quite general criteria of parsimony in use of primitive terms and transparency, (Valente, 1995, p. 42) proposes to adopt the same criterion that we use to value legal theory, that is to analyze the existing legislation and to confront it with the position of the theory: if the legislation and this position correspond to each other, the theory is valid, if not, the theory is not valid.

Other criterion of the legal ontology’s validity is its capability to clarify ontological assumptions of the law: the ontology is valid as much as it is able to represent the legal knowledge both from the epistemological and pragmatic points of view.

Further criteria for the valid legal ontology are comprehensiveness and correctness. The latter criterion implies the relation many-to-many, that is that each term in law can correspond to many terms in ontology and vice-versa. What is the sense of this relation? This relation enables to express the meaning of the legal term on the basis of a certain case, use or situation. This means that the legal term will not have one and only one corresponding term in the ontology, but will have many, each of which will depend on the context where the legal term needs to be used.
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Proceeding with the analysis of the role of ontologies in legal domain, we cannot avoid mentioning that the ontologies in legal domain could be also seen as a tool which helps to solve one of the problems concerning the creation of legal knowledge base systems (LKBS): the problem of the open texture. Open texture is a characteristic applicable to any general term of natural language: according to (Hart, 1965, p.149) such concepts have a central “core” of meaning and “penumbral” meanings around it. The example of Hart is a term “vehicle”: its “core” meaning includes the automobiles, while the “penumbra” includes bicycles, because it is not clear whether the bicycles are really vehicles or not. The decision whether to include a a term among “core” meanings of more general term is done by judges.

(Valente, 1995, p. 59) claims that there are two types of open texture concepts: first type is called incomplete definition (also called world knowledge concept), which means that the concept provides with some but not all necessary conditions to apply it (the bicycle satisfies some but not all conditions to be vehicle). In the copyright law domain, such concept is a concept of copyright work7. Usually the copyright law does not provide with the clear and exact definition of what the copyright work really is. The list of copyright works is usually indication of what is for sure a copyrightable work, but this list is not an exhaustive one (we will turn back to the problem of exhaustiveness of this list later), so we know that a book is copyrightable work, but this does not enable us to affirm what the copyright work really is. The incomplete definition concepts thus are placed in the domain ontologies and not in the upper ones. The second type is called primitive concept (also called common sense concept) which does not have the definition and whose application depends on the person who applies it (such as time, space, consciousness). These concepts are usually placed in the upper ontologies and not in the domain ones. In copyright law domain, the primitive concept could be the concept of property: usually we define this term using the common sense: for example, we could define “property” as an abstract something that someone possesses and this concept of property is placed not in the copyright law domain ontology but in an upper legal ontology8.

(Valente, 1995, p. 60) claims that the treatment of open textured terms should be divided between the computer and the humans: a system should be able to recognize and distinguish these two types of open texted concepts, while their classification and interpretation should be done mainly by the users of the system. Thus, from the ontological point of view, the problem of such terms has to be solved, even if “ontology can never substitute a description of the conceptualization in a natural language, but only support it, or add to it, be working as a device in which some of the ideas are verified for completeness and perhaps coherence” (Valente, 1995, p.79).

The question is whether the problem of open textured concepts could be solved with the help of ontologies? The problem is quite a hard one, but nevertheless some possible solutions are already elaborated: for example, (van Kralingen, 1995, p.112) solves this problem introducing the concepts of definition, deeming provision and factor: each of these terms can define a open textured concept, while (Quast, 1996, p. 43) proposes a generic model for abstract representation of collective knowledge (and the open textured concepts are the concepts of collective knowledge), which is called qualification model.

3. SPECIFIC LEGAL DOMAIN: INTELLECTUAL PROPERTY LAW

This paper addresses the specific domain of law, that is Intellectual Property (IP) law, which is sometimes defined as “law governing rights in information” (McJohn, 2006, p. 6) What is so special about it?

First of all, some clarifications are necessary. IP law is divided into several sub-branches as
copyright, patent law and trademark law. Our focus falls upon the first of these sub-branches, the copyright law. Copyright is defined as “a legal device that provides the creator of a work of art or literature, or a work that conveys information or ideas, the right to control how the work is used” (Fishman, 2006, p. 6). This sub-branch of IP law is also sometimes called the law which protects “the beautiful” (in the contrast with the patent law, which protects “the useful”). To tell the truth, the “beauty” of copyright and the “utility” of patent law is not that simple to distinguish today: the software is a good example of this.

What about the copyright and the ICT? The European Commission has hinted different times and in different occasions the importance of healthy interaction between the intellectual property rights and innovation. Indeed, the technological impact asked the copyright for the fast re-estimation of its concepts introducing new ones (such as multimedia creations) and abandoning the old ones (such as restriction of circulation of the physical objects which incorporate the creations). ICT opens new ways of communication and divulgation of the copyrightable works, underlines new dangers for the legitimate use of them, proposes innovative ways to express one’s creativity, enables more people to learn about human creative potentials and gives rise to numerous problems. The copyright is undergoing the transformation process, which is a direct result of the new phenomenon that is called information society. The biggest challenge for the lawyers from this point of view, is to set down the regulative framework which enables the copyright owners to maintain the rights they possess without any alterations or losses.

Some authors think that whatever changes ICT brings to the copyright domain, it will never change one aspect of it, that is the creation. This aspect is intrinsically linked to the person, who cannot be substituted with the machine (Cardia, 1996, p. 9). Some computer scientists do not agree on this and propose quite a different scenario.

The fear of copyright is to remain motionless in front of the technological tsunami as mere principles which are known (or at least suspected by) to (almost) everyone but followed by no one. They might remain such if the copyright will fight the technology rather than use it. It is true that all branches of law undergo the effects of ICT, nevertheless there is no other branch of law that would be so deeply impacted by those effects: in fact in other branches of law the ICT might cause new procedural solutions, new measures or new tools to facilitate the work, but only the intellectual property law is thrown into confusion and needs to revise its conceptual basis.

The ICT challenges and at the same time offers new opportunities both to the community and to the single authors of works of mind. The challenges have to be overcome and the opportunities have to be exploited. The studies dedicated to the legal (IP included) ontologies are one of the ways to face the challenges. In this context, we present computer system called ALIS to solve problems in different contexts like conflict prevention, alternative dispute resolution, law making or regulatory compliance in the domain of intellectual property law.

### 4. ALIS: THE GENERAL OVERVIEW OF THE SYSTEM AND THE ROLE OF ONTOLOGIES IN IT

Our ontology makes part of the group of ontologies foreseen by the ALIS (Automated Legal Intelligent System) project.

What is this project about? From the general perspective, this is the alliance of two worlds, the legal and the computer science ones. The outcome of this alliance will be a further proof of the benefits that law gains welcoming technological innovations which come from such scientific fields as game theory, knowledge representation and legal reasoning. From more specific perspective, ALIS is not aiming to address the law in general, but...
IP law specifically. The importance of this legal domain has already been addressed above.

ALIS system is the system which aims at facilitating the access to and the use of legal IP law systems in the broadest sense of this term. Such access and use will lend a hand in improving normative compliance with laws and regulations and will assist the evolutionary process of the legal systems.

ALIS addresses four legal contexts: regulatory compliance, conflict prevention, alternative dispute resolution (ADR), law making. What are these contexts about?

Regulatory compliance means ensuring that the public administrations (including governmental institutions), citizens and private companies comply with the legal framework: not only with the laws as such, but also with institutional regulations and public policies and other specific norms that regulate the public and private interests. Regulatory compliance means also the compliance between different sets of law and regulations and ALIS aims not only at ensuring the impossibility to public and private entities to contradict legal framework (external contradictions) but also to avoid the internal ones. For example if the governing party wants to introduce a specific regulation, first of all it should get ensured that such regulation will not contradict the existing legal body. ALIS would be such a consultant in campus of IP law. What is gained eliminating the possibility that legal initiatives contradict the normative framework of the country? First of all, the legal risk is minimized with positive costs reduction effects on the judicial system. Secondly the governance is improved as a consistent legal framework is assumed for good governance. Thirdly, the best practices are shared at the European level disseminating the benefits to the whole European community.

Conflict prevention aims at forestalling the legal disputes between the parties (both public and private). How? By proposing early solutions to come to the agreement acceptable by all the parties involved. In order to do this, ALIS will apply the Game Theory tools. The benefits are both material and immaterial, as the conflict prevention enables not only to save financial and time resources, but also safeguard the relationship between the parties, which could otherwise be damaged if the disagreements would lead to disputes and judicial procedures. If two parties cannot agree on some IP issue (like authorship of the work of mind or the exploitation rights or any other issue pertaining to the campus of IP law), they could consult ALIS and get the proposal of how to organize their issue in a way that no one could lose and both parties could be satisfied.

ADR is a further alternative (next to conflict prevention) to avoid the judicial procedures in order to resolve the disputes among the parties. Substantially ADR is composed of two mechanisms, that is arbitration and mediation. In arbitration process, the role of judge is assigned to the arbitrator, whose decision is binding to the parties. The mediation process differs from the one of arbitration in the non-abidingness of the mediator’s decision. For this reason, the mediation process is less formal than the one of arbitration and the role of mediator is more oriented to help the parties to find the solution by their own initiative, than to propose his own. In this context, ALIS will play the role of dispute resolver who will propose the possible solutions to the parties and will underline the outcomes of any decision they will want to take.

Law making refers to the complicated process of the creation of norms. The legislative body always needs to get ensured about the relevance of new legislative proposals, their role in the actual legal framework, and evaluate the implementation assessment. ALIS could lead this process from the proposal of the new law, passing through the elaboration of the corpus of law and finishing with the implementation procedure evaluation, including the analysis whether the new law contradicts the existing one(s).
In other words, ALIS is absolutely in line with the previsions of the future some lawyers already made several years ago: “Indeed I believe that the practice of law and the administration of justice will be more radically affected in the coming 50 years by IT than by any other single factor of which we can be aware today” (Susskind, 2000, p.79).

In order to achieve its objectives, ALIS involves four ontologies: IP Ontology, Named Entities (NE) Ontology, Game Theory Ontology (GTOnto), and Legal Reasoning Engine (LRE) Ontology. All these ontologies are written in the Web Ontology Language (OWL) (defined as “the language with the strongest impact in the Semantic Web” (Cardoso, 2007, p. 25) using PROTÉGÉ tool.

ALIS IP Ontology is created in order to perform the four main functions. The first is that this ontology should enable the improvements of the management of legal documents repositories. Secondly, the IP ontology should also favour the versatility of the legal document retrieval system. Thirdly, the ontology is used to create a “common” language for the information exchange between the modules and the Web services of ALIS architecture.

The GTOnto conceptually describes Game Theory methods, parameters and tools. The construction of this ontology is based on three dimensional ontological approach: the issues related to this ontology were classified in “definitions”, “properties” and “inclusion relations”. The aim of this ontology is help ALIS system to select and use GT tools for solving the users’ cases. For this reason, the GTOnto developers have abandoned the idea to try to cover comprehensively the GT campus, but to select the categories of games and hence the properties attached to these games with specific goal to chose the ones that could improve the functioning of the system. The macro-classes in this ontology are limited to five:

1. **Game**: This class comprises all elements which can be considered as instantiations of a game where the term “game” is interpreted in the game theoretic sense;
2. **Game parameters**: Describes the characteristics of the game rules with respect to cooperation, utility, symmetry, simultaneity, qualitative nature, strategic sets, dynamics, equilibrium, information, and players;
3. **Game object**: These are alternative dispute resolution, bargaining, compliance, coordination, deterrence, non bargaining or cooperative personal utility maximization, screening, signalling;
4. **Game process**: This class deals with sub-classes related to tools which are used to solve a game and to properties of the game stemming from its analysis.
5. **Game metaphors**: This class comprises best known metaphors of Game Theory in order to represent core issues.

The LRE Ontology is based on conceptual representation of the tools and methods of legal reasoning, such as module specifications, formalization languages, etc. The aim of this ontology is the categorisation and structure of the information related to the characterisation of the different reasoning modules. This ontology is based on three main classes:

1. **LRE modules**: This class describes the implementations;
2. **Formalization languages**: This class lists the general set of possible representational formalisms;
3. **Module specifications**: This class contains the different ways to specify key conceptual and relational aspects of the cases such as social constrains, social states and role.

The NE Ontology is dedicated to the concepts of standard meta data information (for example, location or data) extracted from documents. The
aim of this ontology is to provide an extraction information framework to enrich ALIS documents with useful meta data like locations, monetary quantities, etc. The main classes are Person (datatype properties are Title, FirstName, Surname), Organization (OrgName, OrgType), Numex (NumexUnity like kg, and NumexValue like 130), Timex (TimexDate, TimexTime), Location (Address, Country, City), and Event (that is text references to social, cultural or historical actions like 1st of May or European Football Championship).

How are these ontologies linked among them? The core ontology of ALIS is ALIS IP ontology, as it facilitates the information exchange between different modules. The ontologies in ALIS complement each other and there is a linear conceptual continuity among the ontologies in ALIS: the class Person in the ALIS IP Ontology is related the class Person in NE Ontology (in this case, these two concepts are the same), to class Player in GT Ontology and to the class Roles in LRE Ontology. If we define properties of the form Is_A, it is possible to define relations between these classes in all the ontologies involved.

5. ALIS IP ONTOLOGY

For this ontology we used the bottom-up approach. The ALIS IP Ontology is based on tripartite of key terms in French IP law: the work of mind, the author and intellectual property rights.

The core term in ALIS IP Ontology is work of mind, as a expression of intellectual human efforts. This work of mind may be of different types. French IP law defines the following types of works of mind: abstract authorship, address, applied art work, architectural work, artistic writing, audiovisual work, book, choreographic work, cinematographic work, circus act, collection of miscellaneous works or data, dramatic musical work, dramatic work, drawing work, dumb-show work, engraving work, fashion work, feat, geographical map work, graphical work, illustration work, lecture, literary writing, lithography work, musical composition with words, musical composition without words, painting work, pamphlet, photographic work, photography analogous work, plan work, pleading, scientific writing, sculpture work, sermon, single work, sketch work, software work, three dimensional work, typographical work.

From the legal point of view however this list is not peremptory, that is this list is not enumerating all the works that can be protected by copyright law. On the contrary, this list is indicative and illustrates explicitly the works which are surely protected by law but does not exclude the enlargement of the list, leaving a space for a free judicial interpretation on case-by-case basis: for example, Italian17 Court of Cassation recognized that even if not included in the list of works of mind, the calendars, catalogues of goods and other lists might be protected by the copyright law18. Obviously, from a legal point of view this is justifiable and logic as the legislator could not foresee all the possible expressions of the human intelligence and creativity. This would be impossible and limitative. Nevertheless from the ontological point of view, this logic complicates the construction of ontology, because the concepts which are not explicative in the law, are not included into ALIS IP Ontology. Consequently, from this latter view, the concepts which are not included into ontology, do not exist. And if they do not exist, they are not considered as the works of mind and consequently are not protected, even if legally they could. The solution for this discrepancy could be updating the ontology. The updating should imply that the updater of the ontology follows the national case law and according to the judicial decisions updates the ontology.

The problem exposed above has certain traits in common with the certain problems we faced concerning the features of the logic underlying OWL ontologies, namely Description Logic (Baader, 2003, pp. 349-369) with respect to the
dynamic nature of the legal domain, and the use of ontologies to emulate legal reasoning.

Regarding the dynamic nature of the legal domain, new legal concepts may appear while others disappear, and thus, the ontology has to be updated over time. However, description logic is monotonic, and thus the addition of new concepts to the ontology cannot invalidate previously possible derived conclusions.

An obvious possibility to tackle this issue is to change the axioms constituting the ontology, by making use of belief revision techniques for example. However, despite the declarative nature of ontologies aimed among others to facilitate systems’ maintenance, the necessity to change axioms in order to update the ontology can be rather time consuming for the human operator updating it (e.g. the up-dater may accidentally cause inconsistencies which might not be easily identified and removed).

More generally, it is arguable that ontologies based on a monotonic logic as Description Logic are inappropriate when it is not possible to have a complete knowledge of the domain on which we wish to reason.

Another issue regarding the dynamic nature of the legal domain, is temporal validity of legal concepts. Indeed, a legal concept may be valid for a specific period of time, for example, the period staring at the publication of the regulation introducing the concept and ending at its abrogation. Thus, some temporal information associated with concepts included in legal ontologies may be useful to take into account, but such temporal information cannot be specified using present-day OWL ontologies.

Besides the problems caused by the dynamic nature of legal domain, other issues arise if it is attempted to use ontologies to emulate legal reasoning. Of course, anyone attempting to formalize legal reasoning via logic tools has to face many issues, but a major one comes in mind in the case of Description Logic (beside its low expressiveness).

The issue concerns the monotonicity property of Description Logic. Indeed, legal reasoning is defeasible by nature because legal conclusions can be invalidated in light of further information. On the contrary, in Description Logic, conclusions cannot be invalidated in light of new information. For example, a work of collaboration is a work in the creation of which more than one natural person has participated, but if the work is created at the initiative of a person who edits it, publishes it and discloses it under his direction and name, and the personal contributions of the various authors who participated in its production are merged in the overall work for which they were conceived, without it being possible to attribute to each author a separate right in the work as created, then the work is a collective work (instead of being a work of collaboration). An OWL ontology reasoner may derive that a work of mind is both a work of collaboration and a collective work, and this would be an incoherency.

In this view, the use of Description Logic to account for legal reasoning can be seen as a step backward with respect to the many efforts of the artificial intelligence and law community. We bring this aside to close and return to the main subject, that is triplet on which ALIS IP Ontology is based conceptually. As we have already seen, the first concept of this triplet is Work of Mind, while the second is that of author. A work of mind is created by an author, who may be a natural or legal person, and who may also be anonymous or pseudonymous. Hence, a work of mind may itself be anonymous or pseudonymous. From a legal point of view, it is difficult to imagine situation in which the anonymous work of mind could be created by the legal person though. Nevertheless, we could not exclude such possibility.

The third main concept in the ontology is that of intellectual property rights, which every author is entitled to, and which may also be referred to as incorporeal property rights. French IP law distinguishes between moral and economic rights. Moral rights protect an author’s personality and
reputation. Economic rights enable the copyright owner to benefit economically from the work’s exploitation, and they may be transferred to an economic right holder (publisher, editor, producer) either in part or in full.

French IP Law identifies nine types of moral rights as follows: right of disclose under the name, right of disclose under to direction, right of divulge work, right of make a collection, right of reconsider assignment of exploitation, right of respect for authorship, right of respect for name, right of respect for work, right of withdraw assignment of exploitation.

Economic rights are in turn divided in two groups of rights: right of performance and right of reproduction. The former is the right to communicate the work to the public by any process whatsoever (perform dramas or lyrics, present or project or recite publicly, telediffuse or transmit also through satellite). The latter is the right to fix a work into a physical medium by any process enabling it to be indirectly communicated to the public (publication, cast, draw, engrave, execute, make photos, print, use graphic or mechanical process).

All italicized concepts in this section are represented as OWL classes connected by datatype or object properties.

The design of this ontology gave rise to the problem of inclusion as a tool of classification. In particular, we have designed two orthogonal categorizations: authorship (SingleWork, CollaborativeWork, CompositeWork, CollectiveWork) and type of work (Book, Sermon, Feat, Geographical Map Work, Graphical Work, Illustration Work, Lecture, etc.). It seemed to be logic to apply hierarchical structure: for instance, Graphical Work is a sub-class to each of the classes of authorship, as such kind of works could be done by more than one person. Nevertheless, the problem arises that now every graphical work is automatically each of authorship classes, that is Graphical Work is SingleWork, a CollectiveWork, a CollaborativeWork and a CompositeWork. This is not real though. The solution to this illogical outcome of the design was found in the inclusion of Exclusion relations among the entities and in putting these entities at the same level. The negative part of this solution is that every new instance we want to include into ontology has to belong to two categories: authorship and type, and we are not sure this will function in practice.

ALIS IP Ontology, as a domain ontology, needs to rely conceptually on a upper ontology. Such upper ontology is LKIF-Core Ontology\(^{19}\): as we have already mentioned, there are concepts which could not be included into domain ontology as they are primitive (see part 2.1 of this chapter) and thus belong to the upper ontology. In copyright law domain one of such terms is property.

The top level of LKIF-Core Ontology in its own turn is based upon LRI-Core Ontology. The latter ontology provides with the primitive concepts such as location, time, places and change, which are indispensable for description of any legal reality.

Further level (going from the “top” to the “bottom”) of LKIF-Core Ontology is the intentional level, which includes concepts and relations necessary for the description of the intelligent behaviour of the agents. This level also describes mental state of the agent such as beliefs or expression.

The third level is the legal one: here the set of legal agents, actions, powers, rights, roles is introduced. This set enables the expression of the normative statements.

### 5.1 ALIS IP Ontology: IPROnto

The creation of ALIS IP ontology was strongly influenced by the other ontology dedicated to the same legal domain, that is IPROnto, described by (but not only) (Delgado, 2003, p. 621-634). Unfortunately the lack of ontologies of IP law is obvious and this provokes the lack of confrontation and discussions. There is no sharing of good-practice
or know-how on these issues, which could help the developers of the IP ontologies to solve the problems or to share the knowledge.

Notwithstanding this lack of IP ontologies, IPONTO is an interesting ontological proposal to face the IP domain. IPONTO is addressing enormous domain if we confront it with the one of ALIS IP Ontology. In fact, IPONTO is destined to e-commerce and digital rights management (DRM).

We did not build our IP ontology on IPONTO for several reasons, the main of which is that the IPONTO is much more general and consequently abstract, while the ALIS IP Ontology, based on specific legal framework (that is French Copyright Law), is more definite and precise conceptually. Indeed, ALIS IP Ontology does not share the abstract terminology of the IPONTO. ALIS IP Ontology, on the contrary, follows precisely and almost literally the words of French legislator, avoiding any interpretations or paraphrasing. The precision might also be a limit we have to bear in mind, as the strict and literal linearity with the normative dispositions makes the ALIS IP Ontology less rich every time the French IP law refers to any other law (like it does with Act No. 85-98 of January 25, 1985, on the Judicial Rehabilitation and Liquidation of Enterprises). However the precision in following the French IP law was not total: we excluded certain terms which we retained to be useless and conceptually mistaken, such as “contract for hire”\(^{20}\).

The developers of IPONTO admit this feature of their ontology, but justify it by the goal of IPONTO to cover the entire IP domain and sustain that it would not be difficult to produce versions of IPONTO following specific laws (Delgado, 2003, p. 622). The domain that IPONTO addresses is based on the World Intellectual Property Organization’s (WIPO)\(^{21}\) Copyright Treaty and Berne Convention. These international agreements oblige the states that signed these agreements to respect certain abstract legal principles regarding the intellectual property. This abstractness is obvious if confronted with concrete IP laws of separate states, which consequently are inspired by WIPO Copyright Treaty and Berne Convention but, again, in general position and not in specific norms.

IPONTO presents also a problem of determination of the boundaries of ontology: IPONTO incudes the concept Consumer, while ALIS IP Ontology does not, as the IPONTO covers the wider domain than that of the copyright law as such: indeed, it is oriented toward electronic commerce and digital rights management (DRM).

Which is better: abstract or specific? What ontology should we adopt? We could paraphrase (Quine, 1953, p. 19) who proposes to use “tolerance and experimental spirit” and base our decision on the needs we have: in case we are interested in the whole IP domain covering ontology, the right ontology to chose would be IPONTO, if we are interested in specific proposal on the ontological solution for the particular domain – ALIS IP Ontology could be if not the right answer, at least an interesting direction to have in mind. For the purposes of the ALIS project, we needed an ontology which could ensure that the templates which serve as user interfaces were consistent with the information required by ALIS. This goal could not be achieved by IPONTO which is dedicated to interoperability and automation of different IP frameworks.

5.2 ALIS IP Ontology: ICLOnto

Unfortunately we could not begin the development of ALIS IP Ontology with the inspiration of ICLOnto as we got to know about it afterwards when our ontology was already built. Nevertheless this does not obstacle us to confront these two ontologies and see where they differ and where they are similar.

ICLOnto is an ontology created by Japanese colleagues as a part of The International Copyright Law Articles Consulting System: this ontology aims at overcoming differences in national copy-
right laws (for today the Japanese and Chinese copyright laws) and is used as “a fundamental conceptual framework to maintain consistency among diverse legal representations for a certain legal phenomenon” (Lu, 2008, p.94), that is copyright. This is done through the intention-oriented Legal Knowledge Model (iLKM) that enables to grasp the intention that is “behind” the certain regulation: in other words, the same concept can be expressed differently in articles of law in two different countries. The iLKM model should be able to capture the intention that two (apparently) different articles share: for example, if one article states that “it is prohibited to copy someone’s work without the author’s permission” and the other affirms that “the rights of copy belong to the author”, the intention in both of these articles is to ensure the author’s monopoly of control over her work of mind. The iLKM is supposed to be “an independent “thing” which works as a desirable pivot amongst different laws representations” (Lu, 2008, p.97), which uses two separate models: Law Article Model and Intention Model.

Consequently, the concepts in this ontology are attributed with the intention of the legal article they represent. This is a huge difference from ALIS IP Onto: to grasp the implicit common legal intention is not the goal of ALIS IP Onto which we worked to make as linear with the legal articles as possible. In other words we adopt only Law Article Model but not Intention Model. The decision to reveal intention has sense in case of ICLOnto because this ontology addresses the two copyright laws of two different countries. So, the intention is sort of a leading wire between the Japanese and Chinese legal normative visions on copyright.

Differently from ALIS IP Onto, ICLOnto has only one main class Rights, while such classes as Person and Work (which as we have already mentioned, constitute the key triplet in ALIS IP Ontology) are related classes. Rights then are divided into Copyright and UsageRights.

Copyright is based on WIPO: this is the link between IPROnto and ICLOnto. The difference is that only the class Copyright follows the recommendations of WIPO, while in IPROnto this international agreement plays much more important role. Being guided by the goal of intention grasping, ICLOnto respectively divided the class of UsageRights in rights for general usage and rights of exemptible usage. The rights of general usage involve the person guided by PrivateInterests, while right of exemptible usage represents the person with PublicInterests. These classes represent in fact the intention underneath the actions performed by the persons.

What ICLOnto shares with ALIS IP Ontology is the granularity that IPROnto lacks. From this point of view, ICLOnto and ALIS IP Ontology are fine granularity ontologies, while IPROnto is a coarse granularity ontology: in fact, while ICLOnto and ALIS IP Ontologies specify the legal properties, classes and their relations, in IPROnto prevails the general representation of concepts.

This ontology is a powerful tool for the comparative legal studies. If further developed, this ontology could help us to grasp the essence of different copyright laws all over the world and deepen the studies on the matter. This is also an important point in the light of globalization the web has introduced: indeed, (Lu, 2008, p. 96) indicates four functions that the application of such ontology-based systems could provide us with: first, the browsing of copyright laws of different countries would be provided, secondly, the matching of articles content would be enabled if that article’s intentional orientation is made explicit. Thirdly, due to the matching possibility, the correlative articles are retrieved. Fourthly, through the article information, the user would be helped in clarifying and solving his problems. This last function links ICLOnto to the ALIS IP Ontology which also makes part of the system that aims, among other things, to help the user
to understand what her problem is and to resolve it in the best possible way.

There are some sides of this ontology that we were not able to clarify and this is why also our research on this ontology will proceed. We have not found any references to the upper ontology of ICLOnto and the question is whether such exists.

5.3 ALIS IP Ontology: OCATU Model

A particularity of the ALIS IP ontology is the use of a life cycle model called OCATU, which represents and illustrates five stages of whole process of the lifecycle of work of mind in the IP domain. These stages are:

First stage is called “Organize the work of mind”. This stage includes all the activities that are being performed before the work of mind is created: these actions might be numerous and of a very different kind, such as negotiations or project preparation, the organization of the team of work which will create the work of mind and other preparatory tasks.

Second stage “Create the work of mind” involves the work that directly produces the work of mind. These actions might include writing, drawing, programming, composing, hollowing, painting, making movie or photos, etc. From a legal point of view though, the “organize” stage is strictly linked to the stage of “transfer”, because this “organize” stage involves also the decisions on the distribution of economic rights of the work of mind among the parties who are going to take part in its creation directly or indirectly (for example, one party might organize the premises for the creation of the work of mind, which will be done by the other person. The two persons have to decide before the creation of work of mind how do they divide the economic rights of the work of mind).

Third stage “Assert rights on the work of mind”, concerns the affirmation of the rights. This means

<table>
<thead>
<tr>
<th>Table 1. ALIS IP Onto, IPROnto and ICLOnto compared</th>
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<tr>
<td><strong>Field</strong></td>
</tr>
<tr>
<td>IPROnto: Electronic commercialization of the multimedia domain (with the emphasis of Digital Rights Management (DRM)).</td>
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<tr>
<td>ICLOnto: International copyright laws as the part of the E-learning development and also the basis for the international copyright law articles consulting system.</td>
</tr>
<tr>
<td>ALIS IP Ontology: Intelligent legal system in copyright law domain.</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
</tr>
<tr>
<td>IPROnto: To facilitate the implementation of applications dedicated to the protection, distribution and control multimedia content (that is applications of DRM).</td>
</tr>
<tr>
<td>ICLOnto: 1) To represent models of typical intentions that stand behind the copyright law articles; 2) To enable the users to understand what are the differences and the similarities among the different copyright law articles in different countries with the help of the models as corresponding pivot</td>
</tr>
<tr>
<td>ALIS IP Ontology: 1) to improve the legal document repository management; 2) to create a common layer between GT and legal concepts; 3) to enable the versatility of the document-retrieval system; 4) to develop a common language for the information exchange.</td>
</tr>
<tr>
<td><strong>Upper Ontology</strong></td>
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<tr>
<td>IPROnto: SUMO</td>
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<tr>
<td>ICLOnto: Unknown</td>
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<tr>
<td>ALIS IP Ontology: LKIF-core</td>
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<tr>
<td><strong>WIPO</strong></td>
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<tr>
<td>IPROnto: Yes</td>
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<tr>
<td>ICLOnto: In part</td>
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<tr>
<td>ALIS IP Ontology: No</td>
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<tr>
<td><strong>Life Cycle</strong></td>
</tr>
<tr>
<td>IPROnto: Yes</td>
</tr>
<tr>
<td>ICLOnto: No</td>
</tr>
<tr>
<td>ALIS IP Ontology: Yes</td>
</tr>
<tr>
<td><strong>Granularity</strong></td>
</tr>
<tr>
<td>IPROnto: No</td>
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<tr>
<td>ICLOnto: Yes</td>
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<tr>
<td>ALIS IP Ontology: Yes</td>
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<tr>
<td><strong>Editor</strong></td>
</tr>
<tr>
<td>IPROnto: Protégé</td>
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<tr>
<td>ICLOnto: Hozo</td>
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<tr>
<td>ALIS IP Ontology: Protégé and TopBrain Composer</td>
</tr>
</tbody>
</table>
that after the work is created, and it does not involve only the one person, the status of rights should be clear (as usually before performing the works that include numerous authors, the latter put clearly down in the contract what and how they are going to solve the question of economic exploitation of their work of mind). In this stage, the work of mind might be registered, the authorship declared and other claims on the authorship/ownership of the work of mind claimed.

Fourth stage “Transfer rights to the work of mind” is the stage in which the author of the work of mind can (but is not obliged to if not on contractual basis) transfer his economic rights to someone else. The moral rights (such as right to proclaim or disclaim authorship, to object any modification of the work of mind that the author retains to damage his reputation, to decide when to publish the work of mind or to withdraw the work of mind from the commercial circulation) cannot be transferred.

Fifth and the final stage “Use the work of mind” is the stage in which the owner of the copyright of the work of mind is using his economic rights. The work of mind may be published, translated, distributed, rented, etc. This final stage is particular because it might generate another work of mind, and the process (life cycle) of IP will begin again.

These stages are not explicit sometimes: for example, if the author created a work of mind, he is not obliged to transfer his rights or assert them. The stages represent only the “fullest” possible scenario of the lifecycle of work of mind, but naturally, it might be different.

6. CONCLUSION

We adopted a sort of bottom-up approach in order to illustrate the development of ALIS IP ontology, starting with the general hints on relationship between law and the Semantic Web, then passing to the specificity of the copyright law domain and finishing with the presentation of the project dedicated to copyright law, that is ALIS. Within this project that ALIS IP Ontology is created, developed and applied and with the detailed overview of which we close this Chapter.

We confronted ALIS IP Ontology with two other ontologies that address the IP law domain, that is IPROnto and ICLOnto underlining the differences and similarities. These are the IP law ontologies that we are aware of and in case there were other such ontologies, the further confrontations will be made. All three ontologies address the IP domain with the different linguistic approach. Only the IPROnto in fact is based on the original English text of international agreements, while both the ALIS IP Ontology and ICLOnto are based on English translations of respectively French copyright law and Japanese and Chinese copyright laws.

The acceptance of ontology is the adoption of “the simplest conceptual scheme into which the disordered fragments of raw experience can be fitted and arranged” (Quine, 1953, p. 16). Paraphrasing this thought, we hope that we succeeded in ordering a piece of IP law domain into a scheme. There is still much work left to do and we hope that the ALIS IP Ontology is only a beginning of a larger legal ontology building initiative we hope to take part in.

In this Chapter we presented only a little piece of a general ontology-related problem the implementation of the Semantic Web has to do with. Indeed, the Semantic Web is based on ontologies, and not only legal. Thus, the issue of legal ontologies is only a little part of the semantic-ontological debate, where copyright ontologies are like grains of sand. Nevertheless, this is how the whole project of the Semantic Web is carried out: putting together small pieces into a big picture of the Semantic Web puzzle.
REFERENCES


Ontologies and Law


**KEY TERMS AND DEFINITIONS**

**Author:** The creator of any work, be it written, painted, sculpted, music, a photograph or a film or whatever other type of work of mind.

**Copyright:** Protects expression of authorship or artistic interpretation, but not the idea upon which such expression is based.

**Description Logic:** Logic formalism that enables to represent the knowledge in a structured and well-defined way

**Intellectual Property (IP):** Means intangible property rights which are created by a person’s intellectual creative efforts. The results of these efforts enable the creator or owner to control and profit exclusively from them.

**IP Law:** A branch of law that defines intellectual creations and deals with obtaining, loosing, using, profiting, defending the intellectual property rights. IP law includes trademarks, copyrights, patents and trade secrets. In a more complete vision, it also includes the issues of rights of ideas, unfair competition and rights of publicity.

**IP Rights:** A whole of moral and economic rights (generally: exclusive right of possessing, enjoying, and disposing of a work of mind).

**OCATU Model:** Model which is used in ALIS IP Ontology to represent and illustrate five stages (Organize, Create, Assert, Transfer, Use stages) of whole process of the lifecycle of work of mind in the IP domain.

**Ontology:** A specification of a conceptualization, which is the set of ideas, concepts, and relationships of a certain domain.

**Work of Mind:** Creative expression of intellectual work, which may be of different types: literature, music, figurative arts, architecture, etc.

**ENDNOTES**

1 This chapter is partly supported by the Specific Targeted Research or Innovation Project “Automated Legal Intelligent System” (ALIS), VI Framework Programme of the European Commission, Priority 2, Information Society Technologies.

2 Metaphysics generally means the study of reality. The term comes from the 14 Aristotelian books which appeared after (metà) the books on physics (tà physikà). These 14 books were dedicated to the prime philosophy, which was called metaphysics.


4 Quine’s answer to this question was that we should not consider these entities as the real ones. These entities are “posits” which aim to simplify the collection of our experiences. So we should not consider them in
terms of “real/unreal”, but in terms of “best/worse” at effecting such simplification. For more details, see Quine W.V.O. (1953) “Two Dogmas of Empiricism”, in From a Logical Point of View, Cambridge Mass: Harvard University Press

In case of legal ontologies, there is a question which is much harder to respond than in case of say scientific ontology: this question is “what is law?”. This is a core question in philosophy of law and it is not answered yet.

The same author proposes a list of the core notions of legal ontologies. These notions are: norm, case, contract, institution, person, agent, role, status, normative position (duties, rights), responsibility, property, crime, provision, interpretation, sanction, delegation, legal document. For more details, see (Benjamins, 2005, p. 10).

In ALIS IP Onto we do not use the term copyright work, but the term work of mind, because we decided to keep to terminology of French IP law.

In fact while building ALIS IP Ontology we used the concept of property from the upper ontology: LKIF-Core Ontology.

You will see later that we have called our ontology with the name of ALIS IP ontology, making reference to the IP and not to the copyright law, even if the ontology (for today) deals exclusively only with the French copyright law. The name indicates the possible expansion of this ontology to the remaining sub-branches of IP law, that is patent law and trademark law.

In fact, software is protected by copyright law and considered as the literary work under the Berne Convention for the Protection of Literary and Artistic Works (first signed in 1886). Nevertheless, it might also be protected by patent law. The distinction is made according to what exactly is protected, as the copyright protects the form of program’s expression (if it is original though) and the patent law protects the principles and ideas that are the basis of the software (only in the case when this software satisfies the other requirements of the patentability). It is not impossible that these two kinds of legal protection cumulate in one software, and in such case the different aspects of it are protected by different legal institutions, that is copyright and patent law.


Just to cite one, but a very big problem: what law is applicable for the works of mind distributed on-line? This problem involves different aspects of the copyright protection, such as the terms of protection, duration of protection, enforcement of legal norms, etc.

See for example, Kurzweil, who prophesizes that by 2019 the computers will become virtual artists, which will create their own art and music. For more information, see Kurzweil, R. (1999). The Age of Spiritual Machines. Orion.

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Also called ALIS domain ontology

For example, GUI module is “ontology-based”, that is it connects the user’s input with a specific norm. It is possible that this norm will be obligatory (that is will create an obligation to the user). Game Theory context will take into account this obligation of the user, who in this latter context has a role of a player.
We refer to Italian case law even if the list of works of mind is based on French copyright law: we do this because the Italian and French lists of works of mind are very similar. Cass. civ. Sez. I, 19-07-1990, n. 7397. Retrieved on June 14, 2008 from http://bd46.leggiditalia.it/cgi-bin/FulShow?NAVIPOS=1&DS_POS=0&KEY=46SE1000209808&FT_CID=408782&OPERA=46.

The LKIF Core ontology is available at http://www.estrellaproject.org/lkif-core.

Art. L111-1, 3rd paragraph: The existence of conclusion of contract for hire or of service by the author of a work of the mind shall in no way derogate from the enjoyment of the right afforded by the first paragraph above.


International copyright law should not be intended in the sense of the International copyright agreements, treaties or conventions, but in the sense of the copyright laws of the different countries.

The illustration of this information exchange could be ontology-based GUI module that connects every input of the user with appropriate normative regulation, which might establish a certain duty for that user. The latter is also a Player in GT and the strategy of the Player will automatically take into account the presence of such duty for that Player and will modify the strategy correspondingly.